



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: February 8, 1988

In reply refer to: R-88-10 through -13

Mr. Stanley L. Crane
 Chairman and Chief Executive Office
 Consolidated Rail Corporation
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About 1:16 p.m., eastern standard time, on January 4, 1987, northbound Conrail train ENS-121 departed Bay View Yard at Baltimore, Maryland, on track 1. The train consisted of three diesel-electric freight locomotive units, all under power and manned by an engineer and a brakeman. Almost simultaneously, northbound Amtrak train 94 departed Pennsylvania Station in Baltimore. Train 94 consisted of two electric locomotive units, nine coaches, and three food service cars. In addition to an engineer, conductor, and three assistant conductors, there were seven Amtrak service employees and about 660 passengers on the train. ^{1/}

At this time, the Edgewood block station operator requested that switch 12 at Gunpow, a remote-controlled interlocking, be lined for straight through movement for train traffic on track 2, on which Amtrak train 94 was operating. The wayside signal aspects displayed for train 94 approaching Gunpow on track 2 were "clear" at both the distant (81-2) and home (2N) signal locations, and the wayside signal aspects displayed for train ENS-121 on track 1 was "approach" at distant signal 816-1 and "stop" at the home signal 1N. Automatic control systems in both trains should have displayed aspects corresponding to those of the wayside signals, except that the cab signals of train ENS-121 should have displayed a "restricting" aspect beginning 4,450 feet south of signal 1N.

About 1:30 p.m., Conrail train ENS-121 entered switch 12 onto track 2 causing the switch to realign for movement from track 1 to track 2. When train ENS-121 entered switch 12, the aspect of signal 2N for track 2 changed from "clear" to "stop." The engineer of train 94 apparently recognized that the aspect of signal 2N was "stop" and put his train into emergency braking. However, the train was traveling between 120 and 125 mph and could not be stopped before colliding with train ENS-121. The engineer and 15 passengers aboard train 94 were fatally injured; 174 other persons aboard the trains received minor to serious injuries. The rear Conrail locomotive unit, both Amtrak locomotive units, and the head three passenger cars were destroyed. The middle Conrail locomotive unit was heavily damaged, and the rear nine cars of the passenger train sustained varying degrees of damage.

^{1/} For more detailed information, read Railroad Accident Report--"Rear-End Collision of Amtrak Passenger Train 94, The Colonial, and Conrail Train ENS-121, on the Northeast Corridor, Chase, Maryland, January 4, 1987" (NTSB/RAR-88/01).

At converging interlockings, such as Gunpow, where freight trains or Amtrak work trains normally enter high-speed tracks, there are locations beyond which there is insufficient braking distance to prevent a collision when a freight or work train overruns a "stop" signal and encroaches onto the track in front of a high-speed passenger train. The faster the speed of the passenger train, the longer these hazard zones become. Obviously no signal system can be devised to eliminate this problem, and the potential danger increases dramatically as the speed of the train increases. Proper research by Amtrak should have revealed the dangers of these hazard zones to the safe operation of trains traveling 125 mph or more. Amtrak should have recognized that it could not safely operate trains at 125 mph without requiring all trains operating on the Northeast Corridor to be equipped with automatic train control (ATC).

The vulnerability of high-speed trains to the incursion of other trains at converging interlockings was virtually nonexistent when Amtrak took over the Northeast Corridor. This hazard was created when the National Railroad Passenger Corporation (Amtrak) and the Federal Railroad Administration (FRA) acquiesced and allowed the operation of locomotives on the corridor that lacked ATC (and even automatic train stop (ATS)). (The ATC and ATS modifications would stop the train if the engineer failed to acknowledge a more restrictive cab signal aspect.) The hazard was further exacerbated by the steady buildup of high-speed Amtrak trains and by FRA's certification of 125-mph train speeds without addressing the potential for collision.

The automatic cab signal (ACS) system, installed on the Northeast Corridor between New York and Washington, repeats the wayside signal aspects on a four-aspect cab signal installed in the cars of the locomotives. Once the ACS track circuitry was installed, locomotives required relatively simple modifications to provide continuous ATS and ATC protection. For years, all passenger locomotives, all electric multiple-unit commuter trains, and all electric-freight locomotives operated on the Pennsylvania's electrified territory north of Washington were equipped with such protection. That situation existed when Amtrak took over the corridor and the Conrail was formed in the Penn Central reorganization. However, after Amtrak took over the corridor, Conrail began using trains with locomotives that were equipped with ACS but not with ATS or ATC. Since the late 1970s, the Safety Board has repeatedly recommended that Amtrak require all trains operating on the corridor to use locomotives equipped with ATC apparatus. Amtrak responded that the Safety Board's recommendations were not warranted and began implementing alternative courses of action.

Amtrak's failure to prevent Conrail from replacing locomotives equipped with devices that would automatically comply with the restrictive signal aspects with locomotives not so equipped helped to create the situation in which when the engineer of train ENS-121 failed to comply with signal 816-1 and delayed in complying with signal 1N, there was no safety backup device to prevent this accident. Conrail also contributed by replacing its ATC-equipped locomotives with non-ATC-equipped locomotives.

Based on documents provided by Conrail and the testimony of Conrail's superintendent of motive power-east, the lead locomotive unit of train ENS-121 repeatedly passed through the 51st Street enginehouse at Chicago, Illinois, without receiving the required ACS test when it was the rearmost unit of an outbound locomotive. Because this location presented the last opportunity for this test before a "relayed" through-train passed into ACS territory, it was imperative that the employees responsible for the maintenance of equipment at Chicago perform the test properly.

The Safety Board is convinced that shortcomings in performing the ACS tests should have been discovered by the responsible maintenance-of-equipment supervisors since they had access to the inspection reports. These reports provided proof that the testing was not being done properly. Conrail should take the necessary steps to correct this inadequacy at Chicago and other locations where the ACS tests are performed.

It could not be determined who applied the duct tape to the alerter whistle or for how long the whistle had been muted. Because it was necessary for the whistle to be heard above the sound of the engine, its loud, shrill sound could, at times, be irritating. The Safety Board was unable to confirm or eliminate the possibility that one or both crewmembers of train ENS-121 muted the alerter whistle before or after leaving Bay View. However, if the crewmembers did not mute the whistle and did test the lead unit's ACS system, they should have recognized when they tested the whistle that the whistle was inoperative and would not have alerted them to restrictive signal aspects.

The engineer stated that he manipulated the acknowledgment pedal at the start of the test, and when the whistle failed to sound, he assumed the ACS system was cut out. He said he then cut the ACS system back in, after which the whistle emitted a slight sound. According to the engineer, he then completed the test and all the ACS aspects were displayed.

Postaccident testing revealed that the whistle could not be heard above the sound of the idling engine of an adjacent locomotive. Moreover, an inspection revealed that the lead unit's ACS cut-out cock was sealed in the "in" or open position; therefore, it was not possible for the engineer to have changed the position as he said he did. However, the deadman control cut-out cock in the nose compartment was unsealed in the "out" or closed position. It is conceivable that the engineer may have cut out the deadman control if he erroneously assumed it was the ACS cut-out cock.

Inasmuch as the ACS cut-out cock in Conrail's General Motors units is located in the nose compartment, the engineer may have assumed that the deadman control cut-out cock in the nose compartment of his General Electric (GE) unit was also the ACS cut-out. Even though the deadman and ACS cut-out cocks are shaped differently, the engineer may not have had an occasion to look for the ACS cut-out on a GE unit.

The Safety Board is concerned about the locations of the ACS alerter whistle and the cut-out cocks for the deadman safety control and ACS systems on Conrail locomotive units. Important safety backup devices and the controls for nullifying them should not be located where they can be easily accessed without crewmembers leaving the locomotive cabs. There is a similarly unsatisfactory situation with the safety systems' cut-out cocks in Amtrak's AEM-7 locomotives.

If the engineer actually did turn the deadman control cut-out in error, then it is probable that he assumed he had activated the ACS system. Having made that assumption, it is possible that he saw no need for further testing and unknowingly left Bay View with a muted alerter whistle.

Despite the fact that the engineer of train ENS-121 consistently scored high in the annual rules examinations and was considered to be competent in his work, there were indications that he did not fit well into an organization that depended on individual reliability and ability to perform without close supervision. These

characteristics should have been apparent to management. One supervisor described the engineer as "overconfident and surly," and he intimated that he was resistant to supervisory guidance. The engineer also had been disciplined for belligerence and threatening a crew dispatcher. Although coworkers had described him as outgoing and friendly, one barmaid described him as occasionally "displaying a temper and obnoxious behavior" when drinking. The engineer's propensity for laying off despite an inability to get regular work was a matter of record, as were his frequent infractions of motor vehicle regulations when he was off work. These characteristics were indications that the engineer might have had serious problems that could affect his job performance.

In 1986, FRA had issued its "Field Manual on Drug and Alcohol Use" to assist the railroads in implementing Federal regulations (49 CFR 219.19) on alcohol and drug use by railroad employees. According to Conrail's manager of rules, this manual had been distributed in 1986 to supervisors as part of Conrail's Management Awareness Program. The manual cited "key criteria" for "early identification of work performance problems," including increased absenteeism and sick days, frequent mood changes or swings, decreased ability to receive constructive criticism, increased aggressiveness or defensiveness, incidents of hostility toward fellow workers, and encounters with police. The Safety Board believes that the engineer's absenteeism and rules violation should have alerted his supervisors to a potential employee problem and should have caused them to do additional checking on the engineer which may have enabled them to learn of the engineer's motor vehicle violations and his chemical dependency.

Further, had Conrail had reasonable cause testing as a part of its drug and alcohol program, the engineer's record of absenteeism would probably have qualified as reasonable cause for testing and his chemical dependency uncovered. Unfortunately, Conrail did not have such a provision in its drug and alcohol program. Further, it appears that because of a decreasing amount of work for its train crews in this area, the engineer's supervisors were probably not overly concerned about the engineer's record of absenteeism and never checked further to determine if the engineer had other problems.

The Safety Board previously expressed concern about the need for organizations that provide public transportation to monitor properly the performance of operating employees, including off-duty indicators of potential performance problems. After investigations of accidents involving air carriers and operators of inter-city bus lines, 2/ the Safety Board has suggested that the driving records of operating employees be monitored (this may require the permission of the employees) through State departments of motor vehicles (which have access to the National Driver Register (NDR) operated by the National Highway Traffic Safety Administration of the U.S. Department of Transportation (DOT)) to learn of serious motor vehicle operating violations, including driving while intoxicated or using drugs. These indicators should then be used as a part of a program of supervision of the employees that would include taking appropriate actions when early signs of problems appear.

2/ Highway Accident Report--"Intercity Tour Bus Loss of Control and Rollover Into the West Walker River, Walker, California, May 30, 1986" (NTSB/HAR-87/04); and Aircraft Accident Report--"Simmons Airlines Flight 1746, Embraer Banderante, EMB-110P1, N1356P, Near Alpeno, Michigan, March 13, 1986" (NTSB/AAR-87/02).

The Safety Board believes that this is a deficiency in the current system and that rail employers should have access to the NDR. This type of data can be important for an accurate assessment of an individual's fitness to operate a train. Access to driving records on an individual State basis may not provide complete information, as drivers often commit traffic offenses in multiple jurisdictions.

On June 22, 1987, the DOT proposed the enactment of legislation that would provide access to the NDR by other transportation employers (rail and air). On November 5, 1987, the U.S. Senate passed a major railroad safety bill that included access to the NDR by rail employers and the FRA. Similar legislation has been proposed in the House of Representatives.

The Safety Board believes that Conrail should do more to ascertain facts about employees who are in safety critical positions so that Conrail can be alerted to early warnings of potential performance-related problems. Conrail should develop a policy that would provide supervisors with criteria regarding the employees' driving record, absenteeism, on-the-job violations, and other factors. These criteria would require specific actions including supervisory discussions with the employee, counseling, or suspensions when the combination of such warning signs reach predetermined levels.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Consolidated Rail Corporation:

Expedite the current program for installing automatic safety backup devices on your fleet of locomotives. (Class II, Priority Action) (R-88-10)

Improve its procedures for inspecting and testing automatic control system apparatus at Chicago, Illinois, and other initial terminals. (Class II, Priority Action) (R-88-11)

Modify the locomotives so that cut-out cocks for the automatic control system and safety control systems cannot be accessed by traincrews while they are en route. (Class II, Priority Action) (R-88-12)

Improve the methods of identifying employees who abuse alcohol and/or drugs. (Class II, Priority Action) (R-88-13)

Also as a result of its investigation, the Safety Board issued Safety Recommendations R-88-1 through -9 to the National Railroad Passenger Corporation (Amtrak) and R-88-14 to the Federal Railroad Administration. In addition, Safety Recommendation R-84-46 was reiterated to the Federal Railroad Administration.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, NALL, and KOLSTAD, Members, concurred in these recommendations.


By: Jim Burnett
Chairman